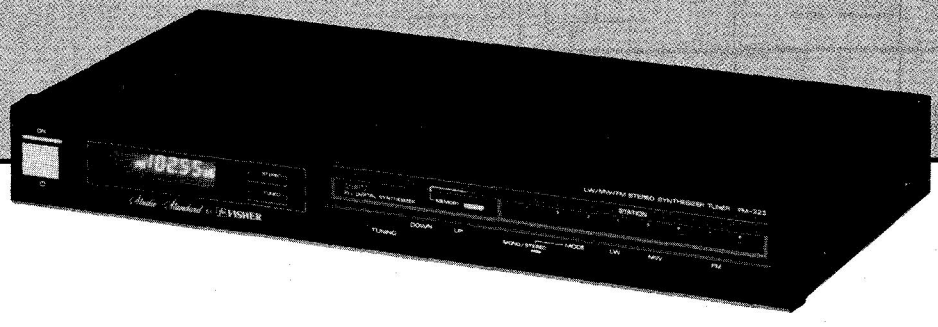
SERVICE MANUAL

FISHER

FM-223

LW/MW/FM Stereo Synthesizer Tuner

(EUROPE)



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WM-17167

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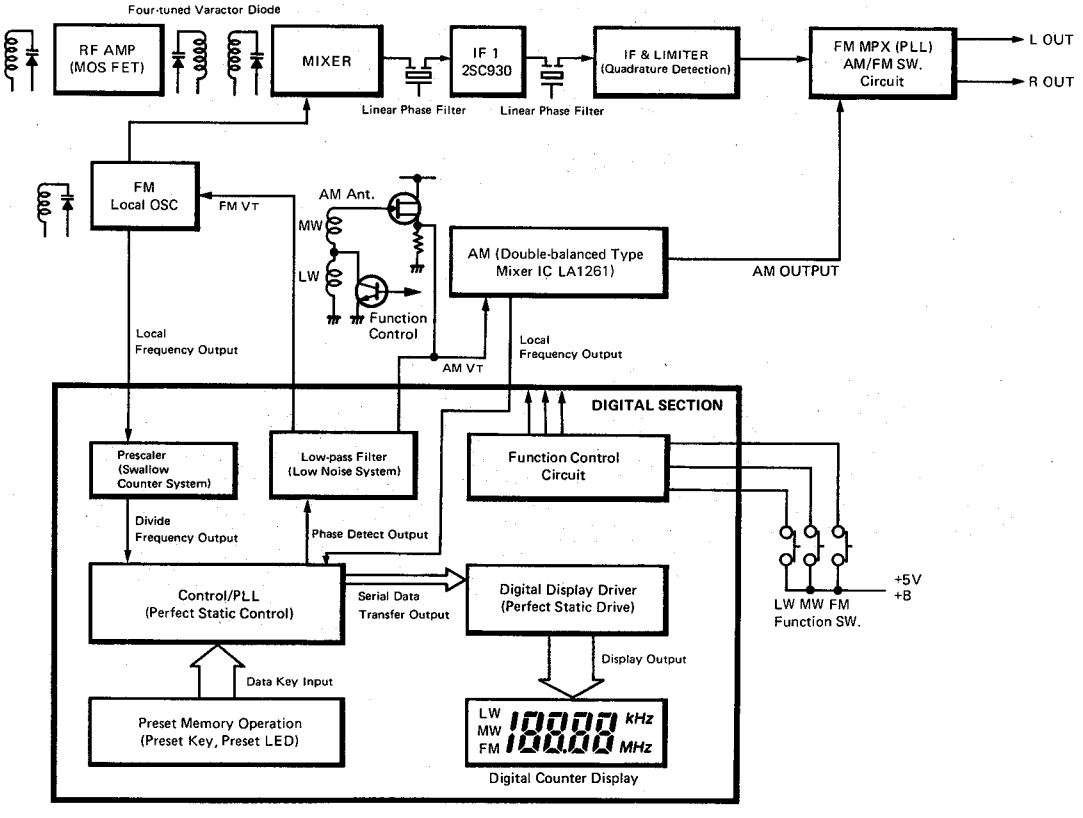
FUNCTIONAL BLOCK DIAGRAM

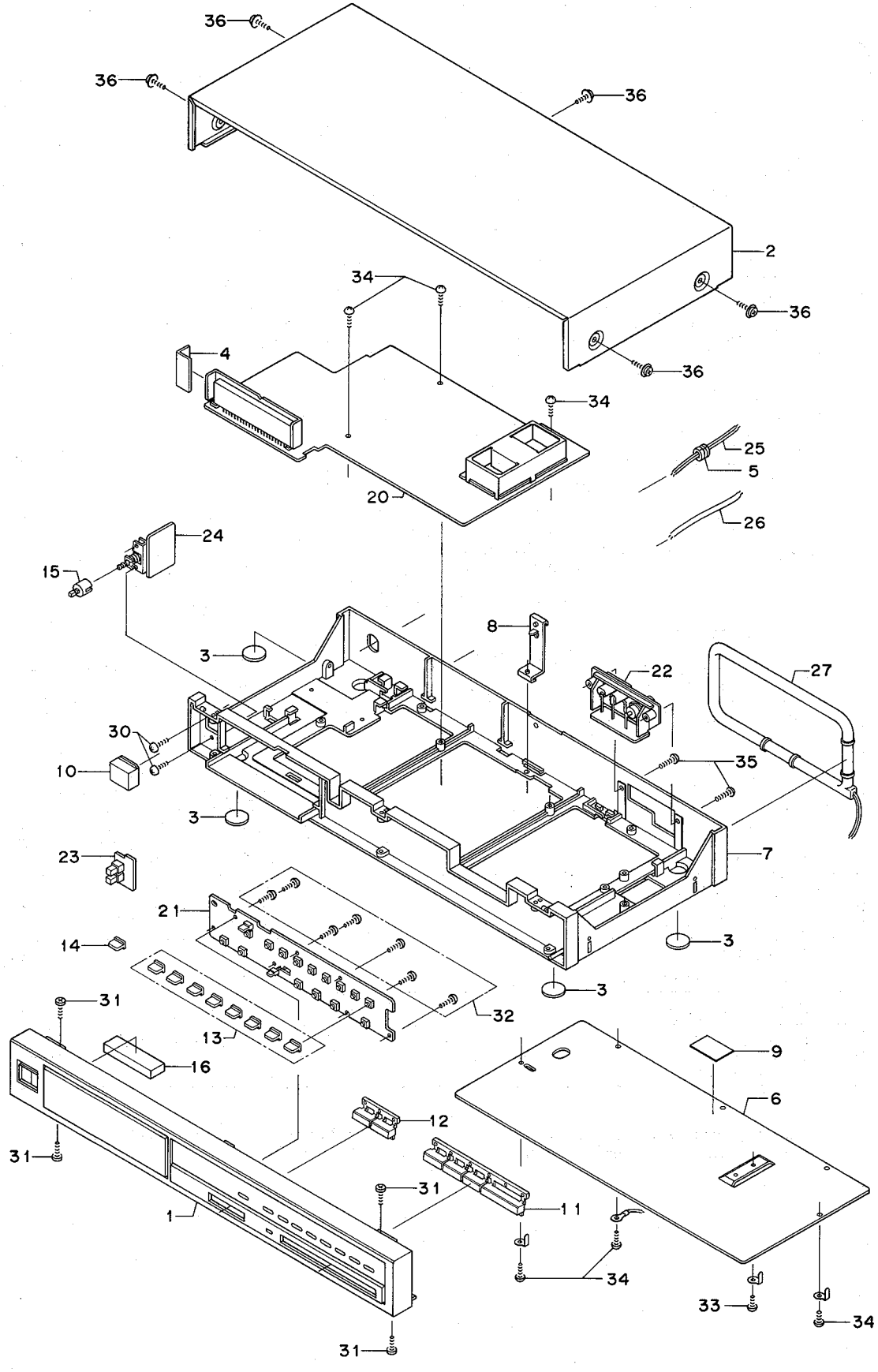


SPECIFICATIONS

LW/MW/FM STEREO TUNER		FM-223	
FM SECTION			
Usable Sensitivity	Mono	3.5μV/16.07 dBf	
	Stereo	10.0μV/25.20 dBf	
50 dB Quieting Sensitivity	Mono	5.0μV/19.19 dBf	
	Stereo	70μV/42.10 dBf	
Signal-to-Noise Ratio	Mono	70 dB	
	Stereo	65 dB	
Capture Ratio		1.5 dB	
Alt. Channel Selectivity (±400 kHz)		50 dB	
Image Response Ratio		46 dB	
Spurious Response Ratio		80 dB	
IF Response Ratio		90 dB	
AM Suppression Ratio		50 dB	
Total Harmonic Distortion at 50 dB Quieting	Mono	0.4 %	
	Stereo	0.5 %	
Total Harmonic Distortion at 65 dBf (IF Bandwidth Normal)	Mono (100 Hz/1 kHz/6 kHz)	0.3/0.3/0.4 %	
	Stereo (100 Hz/1 kHz/6 kHz)	0.4/0.4/0.9 %	
Stereo Separation	(100 Hz/1 kHz/10 kHz)	40/40/30 dB	
Sub-Carrier Rejection (19 kHz/38 kHz)		30/50 dB	
Audio Frequency Response	(20 Hz – 15 kHz)	±3.0 dB	
AM SECTION		**MW**	**LW**
Usable Sensitivity		600 μV/m	1500 μV/m
Selectivity (±10 kHz)		40 dB	40 dB
Signal-to-Noise Ratio		55 dB	55 dB
Image Response Ratio		40 dB	40 dB
IF Response Ratio		60 dB	60 dB
GENERAL			
Power Requirements (50 Hz)		19 V AC	
Power Consumption		10 Watts	
Dimensions (W x H x D)		400 x 54 x 207 mm	
Weight (approx.)		1.9 kg	

Because its products are subject to continuous improvement, Fisher Corporation reserves the right to modify product designs and specifications without notice and without incurring any obligation.

CABINET & CHASSIS EXPLODED VIEW



CABINET & CHASSIS PARTS LIST

Ref. No.	Part No.	Description	Q'ty
	PACKING PARTS LIST		
	3-9415-10300	Bag Polyethylene	1
	131-6-3069-16840	Patching Sheet	1
	131-6-4559-11200	Serial No. Sheet	2
	131-6-9459-00300	Rubber Band	1
	141-6-1139-97018	Outer Cor. Carton	1
	141-6-1449-97400	Case Styrofoam	2
	141-6-2519-10019	Poly Cover 100 x 190	1
	141-6-2519-22390	Sheet Polyethylene	1
	ACCESSORIES PARTS LIST		
	131-0-4012-00180	FM Antenna	1
	131-6-2719-10401	Bag Fan	1
	141-2-1729-00500	Holder Antenna	1
	142-6-4119-32974	Explanatory Booklet	1
	CABINET & CHASSIS PARTS LIST		
	4-2379-21520	Terminal Lug	3
	131-6-4559-11200	Serial No. Sheet	1
	141-2-1419-16766	Name Plate (Rating)	1
1	131-0-1016-45402	Cabinet Front Assy	1
	131-2-1110-39700	Plate Decorate	1
	131-2-1203-65902	Cabinet Front	1
	131-2-1205-29500	Decorate Plate Dial	1
	131-2-6308-23701	Filter (Digitron)	1
2	141-2-1129-07001	Cover Top	1
3	131-2-1801-16200	Leg	4
4	131-2-6107-31000	Plate Sever	1
5	131-2-6111-14200	Bushing (Line Out)	1
6	141-2-1259-07100	Cover Bottom	1
7	141-2-3119-22200	Chassis Cabinet	1
8	141-2-3229-48000	Plate Earth	1
9	141-2-4359-37900	Insulator	1
10	131-2-1601-86200	Knob (Power)	1
11	131-2-1601-98200	Knob (Function)	1
12	131-2-1601-97001	Knob (Up/Down)	1
13	131-2-1601-97100	Knob (Station)	8
14	131-2-1601-97101	Knob (Memory)	1
15	131-2-4219-17100	Shaft	1
16	131-2-5205-32400	Cushion	1

Ref. No.	Part No.	Description	Q'ty
	ELECTRIC PARTS LIST		
20	141-0-1939-14012	Tuner P.C.B. Assy	1
21	141-0-1939-14021	Keyboard Switch P.C.B. Assy	1
22	141-0-1939-14031	Antenna Terminal P.C.B. Assy	1
23	141-0-1939-14041	LED P.C.B. Assy	1
24	141-0-1939-14051	Power Switch P.C.B. Assy	1
25	4-2369-74581	Plug Cord RCA (Output)	1
26	⚠ 4-2369-75910	Plug Cord Power	1
27	4-2579-71601	Loop Antenna	1
	SCREW PARTS LIST		
30	101-3-1303-00611	Screw, Pan Hd., +M3.0x6	2
31	143-3-1702-60818	Screw, Bind Hd. Tapping-B, +M2.6x8	4
32	143-3-1902-60811	Screw, Brazier Hd. Tapping-B, +M2.6x8	7
33	143-3-1903-00611	Screw, Brazier Hd. Tapping-B, +M3.0x6	1
34	143-3-1903-00811	Screw, Brazier Hd. Tapping-B, +M3.0x8	6
35	143-3-1903-00818	Screw, Brazier Hd. Tapping-B, +M3.0x8	2
36	141-2-4219-33101	Screw, Bind Hd. Tapping-B, +M3.0x8	5
C400	CC1-0-3500-ZG00C	Ceramic 0.01μF 50V +80,-20%	1

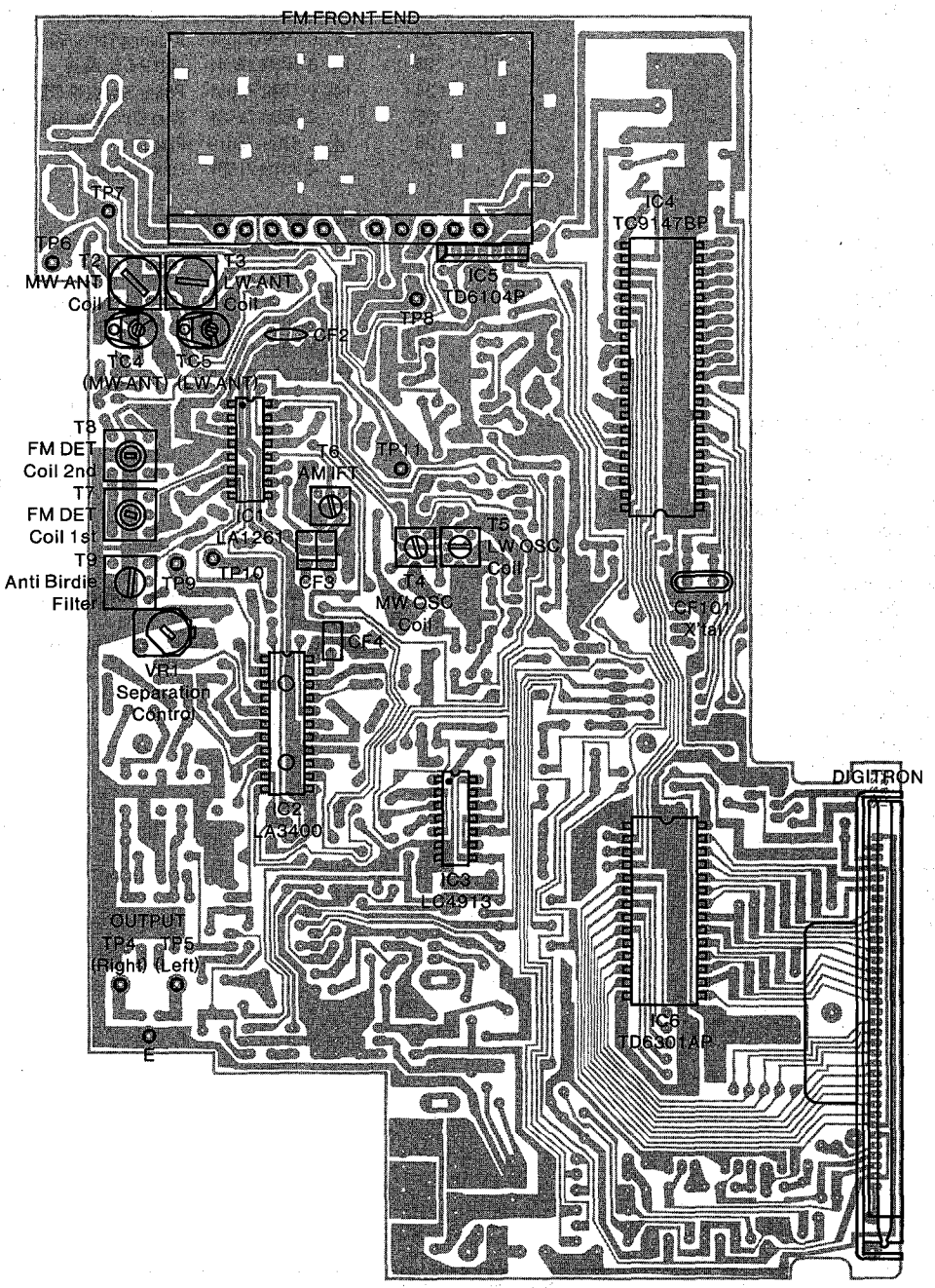
NOTES:

1. Parts order must contain Model Number, Part Number and Description.
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.

PRODUCT SAFETY NOTICE

Each precaution in this manual should be followed during servicing. Components identified with the IEC symbol ⚠ in the parts list and the schematic diagram designate components in which safety can be of special significance. When replacing a component identified with ⚠, use only the replacement parts designated, or parts with the same ratings of resistance, wattage or voltage that are designated in the parts list in this manual.
Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before returning the product to the customer.

TUNER P.C.BOARD LAYOUT
ALIGNMENT POINTS
(TOP VIEW)



MW/LW Frequency Cover Range
Tuning Voltage Value at TP11

(Table 1)

	522kHz	1611kHz	153kHz	360kHz
Minimum	1.0V	7.0V	0.7V	6.0V
Typical	1.3V	8.03V	0.93V	6.7V
Maximum	1.4V	9.0V	1.2V	8.0V

AM TUNER ALIGNMENT

AM ALIGNMENT – FUNCTION switch to LW or MW position.
Maintain generator output as low as possible for suitable indication.

Note:
Perform this alignment after FM Tuner Alignment.

ITEM	GENERATOR	DIAL SETTING	INDICATOR	PROCEDURE
1. AM IF ALIGNMENT	Connect 450kHz Radio IF Genescope output to TP6 and TP7 (GND).	Position of non-interference DIGITAL Counter Display Set to 999kHz.	Connect Radio IF Genescope input to TP10 and ground lead to chassis.	Adjust AM IFT (T6) for maximum gain and best symmetry. Keep signal low enough for noise on responce.
2. MW RF FREQUENCY COVER ALIGNMENT (522kHz)	Do not connect generator.	Front Panel DIGITAL Counter Display Set to 522kHz.	Connect DC Voltmeter to TP11 and ground lead to chassis.	Voltmeter reading Specified Tuning Voltage Value. **(See Table 1.)**
3. (1611kHz)	Same as above.	DIGITAL Counter Display Set to 1611kHz.	Same as above.	Same as above.
4. LW RF FREQUENCY COVER ALIGNMENT (153kHz)	Do not connect generator.	Front Panel DIGITAL Counter Display Set to 153kHz.	Same as above.	Same as above.
5. (360kHz)	Same as above.	DIGITAL Counter Display Set to 360kHz.	Same as above.	Same as above.
6. MW RF TRACKING ALIGNMENT (603kHz)	Connect Standard Loop Antenna to output terminal of AM RF Signal Generator. Place Test Loop Antenna 60cm away from Loop Antenna. Generator Setting to 603kHz or 1404kHz. Modulate with 400Hz (30 % modulation).	DIGITAL Counter Display Set to 603kHz.	Connect AC VTVM and Oscilloscope to TP4 or TP5 TUNER OUT.	Adjust MW Antenna Coil (T2) for maximum gain output.
7. (1404kHz)		DIGITAL Counter Display Set to 1404kHz.	Same as above.	Adjust TC4 (ANT) for maximum gain output.
Note: Repeat the adjustments in Items 6 and 7. Then, confirm there is no tracking error.				
8. LW RF TRACKING ALIGNMENT (160kHz)	Change generator setting to 160kHz.	DIGITAL Counter Display Set to 160kHz.	Connect AC VTVM and Oscilloscope to TP4 or TP5 TUNER OUT.	Adjust LW Antenna Coil (T3) for maximum gain output.
9. (350kHz)	Change generator setting to 350kHz.	DIGITAL Counter Display Set to 350kHz.	Same as above.	Adjust TC5 (ANT) for maximum gain output.
Note: Repeat the adjustments in Items 8 and 9. Then, confirm there is no tracking error.				

Use a screwdriver with plastic grip for all adjustments.

CAUTION: This precision high-fidelity instrument should be serviced only by qualified personnel, trained in the repair of transistor equipment and printed circuitry.

FM TUNER ALIGNMENT

FM ALIGNMENT – FUNCTION switch to FM STEREO

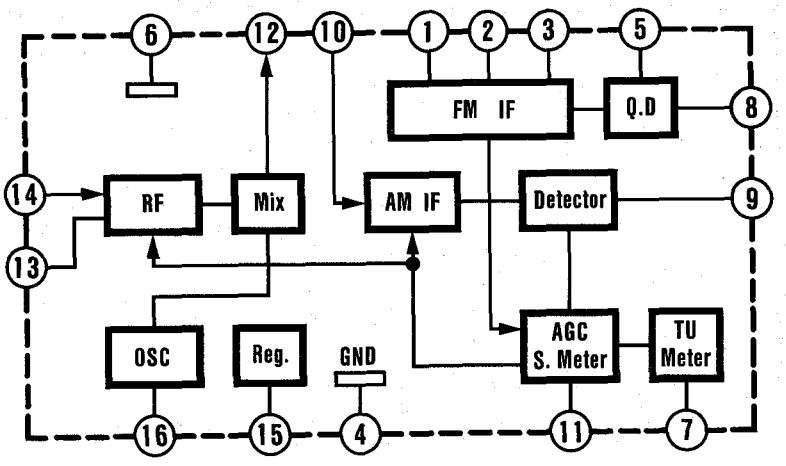
Note: It is almost unnecessary to adjust coil in Front End as perfectly adjusted.

ITEM	GENERATOR	DIAL SETTING	INDICATOR	PROCEDURE
Note: The FM IF circuit utilizes a non-turnable ceramic filter which establishes the IF bandpass. To insure symmetrical turning and selectivity, the IF must be aligned precisely to the center of the filter bandpass, rather than to 10.7MHz as in conventional LC circuits.				
1. FM IF S-CURVE ALIGNMENT	Connect 10.7MHz Radio IF Genescope output to TP8 and ground lead to chassis. Use 5pF capacitor in series with generator output lead.	Position of non-interference Front Panel DIGITAL Counter Display Set to 98MHz.	Connect Radio IF Genescope input to TP9 and ground lead to chassis. Use 1pF capacitor in series with generator output lead.	Adjust FM DET 1st Coil (T7) and FM DET 2nd Coil (T8), so that S-wave form becomes symmetrical.
2. DETECTOR ALIGNMENT (MINIMUM T.H.D.)	Connect FM RF Signal Generator to through FM Dummy Antenna to FM Antenna terminals. Set generator to 98MHz ±2kHz. Modulate with 1kHz to provide ±40kHz deviation. Setting Generator with attenuator output level for 60dBμ.	DIGITAL Counter Display Set to 98MHz.	Connect Harmonic Distortion Meter to TP4 or TP5 TUNER OUT.	Adjust FM DET 2nd Coil (T8) for minimum gain and best linearity.
3. FM STEREO SIGNAL SEPARATION CONTROL	Connect FM Stereo SG to FM Antenna terminals. 19kHz signal ON. Main channel, sub channel signal ON. Apply 1000Hz signal from LEFT channel.		Connect AC VTVM and Oscilloscope to TP4 Right CH. TUNER OUT.	Adjust VR1 for minimum output.
	Same as above for RIGHT channel.		Connect AC VTVM and Oscilloscope to TP5 Left CH. TUNER OUT.	

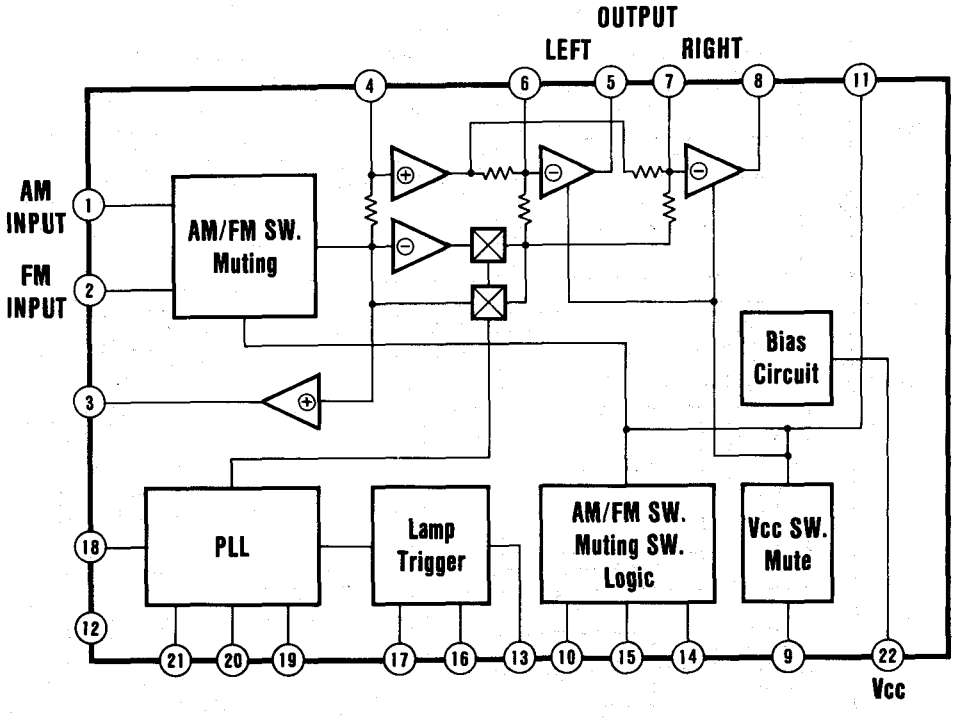
Use a screwdriver with plastic grip for all adjustments.

IC EQUIVALENT CIRCUIT & BLOCK DIAGRAM

FM/AM IF IC LA 1261

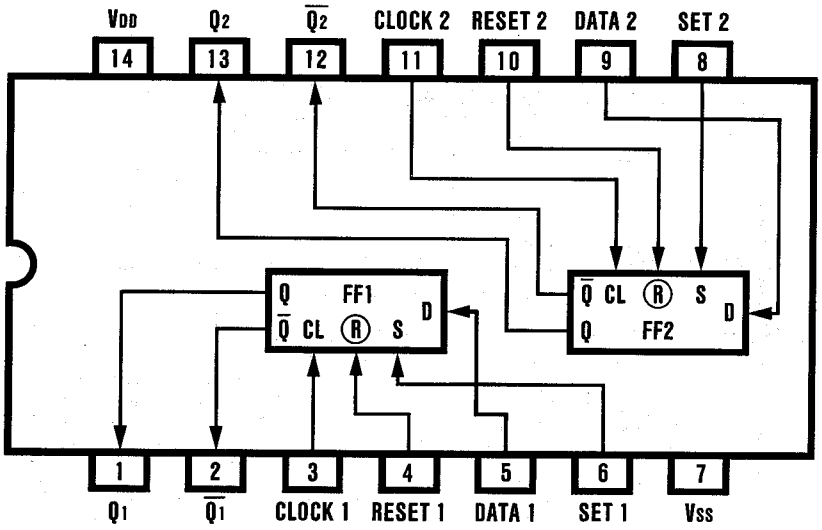


FM MPX IC LA 3400

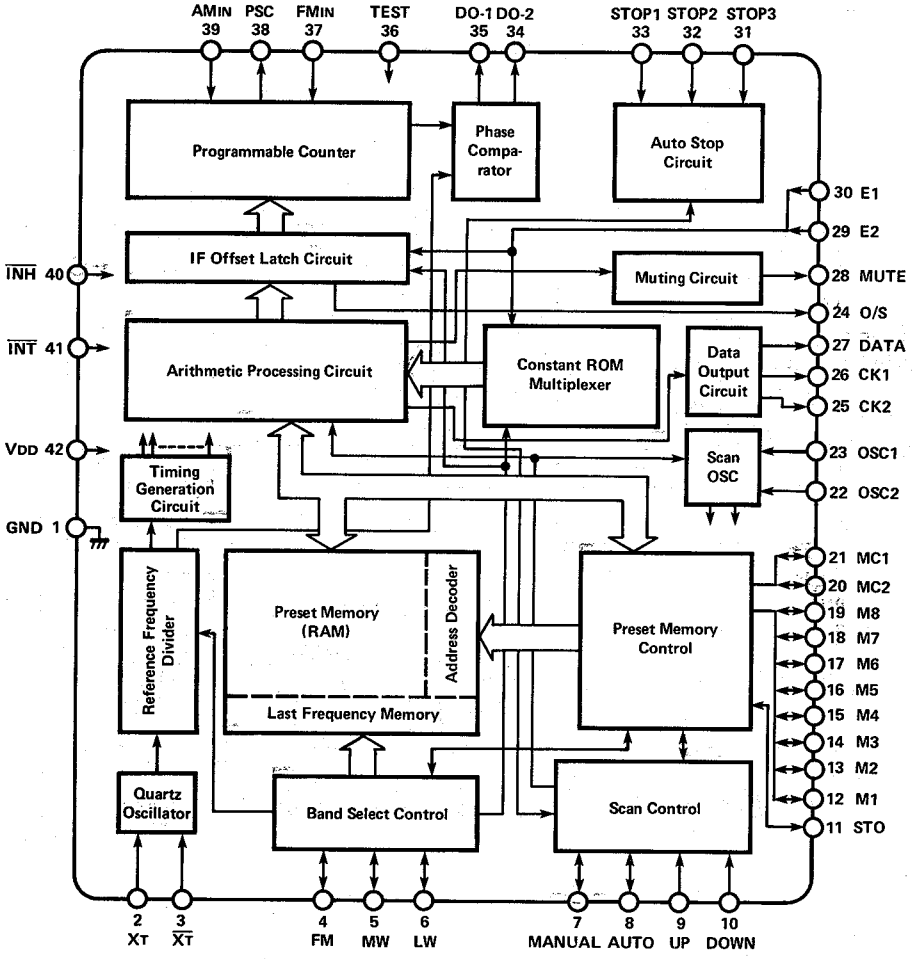


IC EQUIVALENT CIRCUIT & BLOCK DIAGRAM (Continued)

AUTO/MANUAL, ST MUTE IC LC 4913

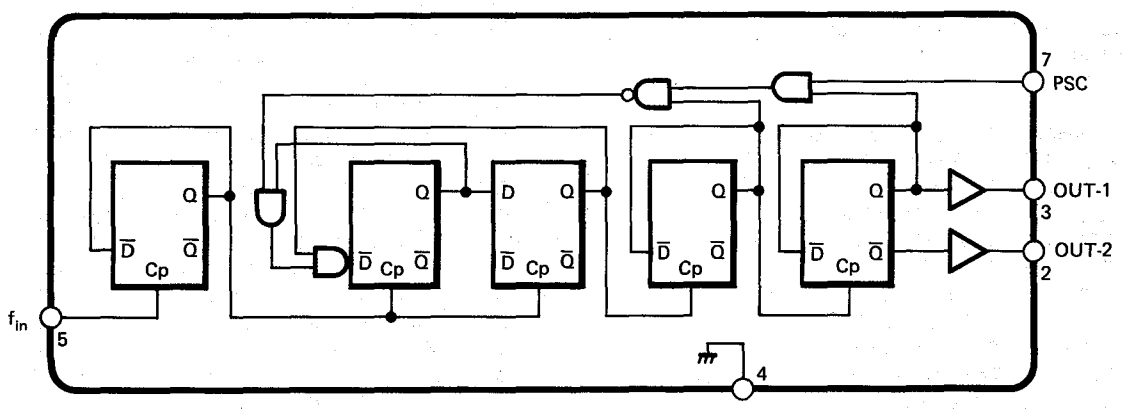


PLL CONTROL IC TC 9147 BP

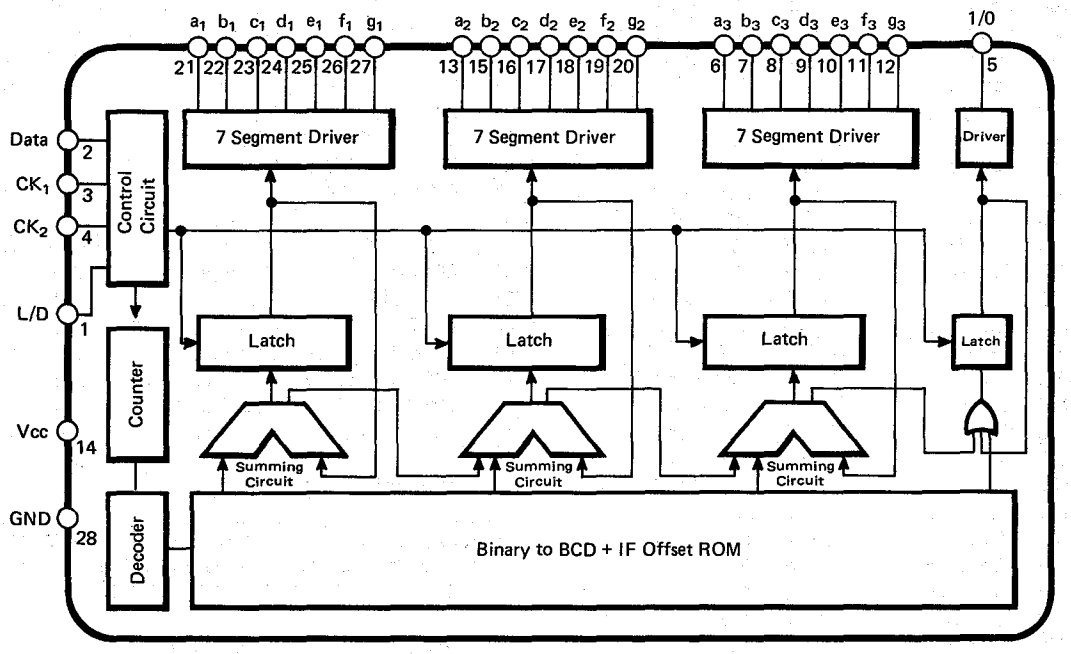


IC EQUIVALENT CIRCUIT & BLOCK DIAGRAM (Continued)

FM PRE SCALAR IC TD 6104 P



STATIC DRIVER IC TD 6301 AP



P.C.BOARD PARTS LIST

Ref. No.	Part No.	Description			Q'ty
	TUNER P.C.B. ASSY				
20	141-0-1939-14012	Tuner P.C.B. Assy			1
	4-2262-25871	Tuner P.C.B.			1
	4-1259-72062	FM Front End Eu-4 AGC			1
		(Component parts used in Front End are not serviceable and available.)			
DG1	4-2142-00080	Digitron			1
VR1	4-2222-00960	Potentiometer (B-100kΩ)			1
TC4	4-2242-00120	Film Trimmer 8pF			1
TC5	4-2242-00180	Film Trimmer 16pF			1
CF2	4-2272-00301	Ceramic Filter 10.7MHz			1
CF3	4-2272-00230	Ceramic Filter 450kHz			1
CF4	4-2279-70080	Ceramic OSC			1
CF101	4-2252-00082	Crystal 7.2MHz			1
L7	4-2539-71420	Choke Coil (100μH)			1
L8	4-2539-71420	Choke Coil (100μH)			1
L101	4-2539-71600	Choke Coil (33μH)			1
T2	4-2579-71730	MW ANT Coil			1
T3	4-2579-71740	LW ANT Coil			1
T4	4-2589-72475	MW OSC Coil			1
T5	4-2589-72485	LW OSC Coil			1
T6	4-2569-71681	AM IFT			1
T7	4-2569-71690	FM DET 1st			1
T8	4-2569-71691	FM DET 2nd			1
T9	4-2529-70230	Anti Birdie Filter			1
	111-2-6220-11100	Wire Wrap Terminal			11
	131-2-5205-22503	Cushion			1
	131-2-6201-21500	Plate Heat Sink (for Q202)			1
	141-2-3889-03400	Bracket Digitron			1
	CAPACITORS				
C18	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C19	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C20	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C22	CC2-0-0500-JD00C	Ceramic	20pF	50V ±5%	1
C23	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C24	CC8-0-A500-DD00C	Ceramic	8pF	50V ±0.5pF	1
C25	CD2-2-5500-0001V	Electrolytic	2.2μF	50V	1
C26	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C27	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C28	CS4-3-1500-J00V	Polystyroul	430pF	50V ±5%	1
C29	CC6-8-0500-KD00C	Ceramic	68pF	50V ±10%	1
C30	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C31	CS3-3-1500-J00V	Polystyroul	330pF	50V ±5%	1
C32	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C33	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C34	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C35	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C36	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C37	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C38	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C39	CM2-7-3500-K00SV	Mylar	0.027μF	50V ±10%	1
C40	CD4-7-663A-0001V	Electrolytic	47μF	6.3V	1
C41	CM1-0-3500-K00SV	Mylar	0.01μF	50V ±10%	1
C42	CD1-0-5500-0001V	Electrolytic	1μF	50V	1
C43	CD4-7-6160-0001V	Electrolytic	47μF	16V	1
C44	CD1-0-6160-0001V	Electrolytic	10μF	16V	1
C45	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C46	CD2-2-6100-0001V	Electrolytic	22μF	10V	1
C47	CD4-7-663A-0001V	Electrolytic	47μF	6.3V	1
C48	CC1-0-2500-ZG00C	Ceramic	0.001μF	50V +80,-20%	1
C49	CM4-7-3500-K00SV	Mylar	0.047μF	50V ±10%	1

Ref. No.	Part No.	Description			Q'ty
C50	CC2-2-1500-KD00C	Ceramic	220pF	50V ±10%	1
C51	CC2-2-1500-KD00C	Ceramic	220pF	50V ±10%	1
C52	CD1-0-6160-0001V	Electrolytic	10μF	16V	1
C53	CD1-0-6160-0001V	Electrolytic	10μF	16V	1
C54	CD4-7-4500-0001V	Electrolytic	0.47μF	50V	1
C55	CD1-0-5500-0001V	Electrolytic	1μF	50V	1
C56	CD4-7-5250-0001V	Electrolytic	4.7μF	25V	1
C57	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C59	CC3-3-1500-KD00C	Ceramic	330pF	50V ±10%	1
C60	CC3-3-1500-KD00C	Ceramic	330pF	50V ±10%	1
C61	CD1-0-5500-0001V	Electrolytic	1μF	50V	1
C62	CD1-0-5500-0001V	Electrolytic	1μF	50V	1
C63	CC3-3-2500-KE00C	Ceramic	0.0033μF	50V ±10%	1
C64	CC3-3-2500-KE00C	Ceramic	0.0033μF	50V ±10%	1
C65	CD1-0-4500-0001V	Electrolytic	0.1μF	50V	1
C80	CC4-7-1500-KD00C	Ceramic	470pF	50V ±10%	1
C93	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C94	CC4-7-0500-KD00C	Ceramic	47pF	50V ±10%	1
C95	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C97	CC4-7-0500-KD00C	Ceramic	47pF	50V ±10%	1
C98	CD1-0-6160-0001V	Electrolytic	10μF	16V	1
C101	CC4-7-3500-ZG00C	Ceramic	0.047μF	50V +80,-20%	1
C102	CD4-7-663A-0001V	Electrolytic	47μF	6.3V	1
C105	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C106	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C107	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C108	CD4-7-663A-0001V	Electrolytic	47μF	6.3V	1
C109	CD2-2-8100-0001V	Electrolytic	2200μF	10V	1
C110	CD1-0-7100-0001V	Electrolytic	100μF	10V	1
C111	CC2-2-3500-ZG00C	Ceramic	0.022μF	50V +80,-20%	1
C112	CD1-0-5500-0001V	Electrolytic	1μF	50V	1
C113	CD1-0-5500-0001V	Electrolytic	1μF	50V	1
C114	CC2-7-0500-JCH0C	Ceramic	27pF	50V ±5%	1
C115	CC2-7-0500-JCH0C	Ceramic	27pF	50V ±5%	1
C118	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C119	CC2-2-3500-ZG00C	Ceramic	0.022μF	50V +80,-20%	1
C120	CC3-9-0500-KD00C	Ceramic	39pF	50V ±10%	1
C121	CM1-0-3500-K00SV	Mylar	0.01μF	50V ±10%	1
C122	CC3-9-0500-KD00C	Ceramic	39pF	50V ±10%	1
C123	CC2-2-3500-ZG00C	Ceramic	0.022μF	50V +80,-20%	1
C124	CD3-3-5500-0001V	Electrolytic	3.3μF	50V	1
C201	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C202	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C203	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C204	CC1-0-3500-ZG00C	Ceramic	0.01μF	50V +80,-20%	1
C205	CD1-0-8350-0001V	Electrolytic	1000μF	35V	1
C206	CD1-0-7160-0001V	Electrolytic	100μF	16V	1
C207	CD4-7-6100-0001V	Electrolytic	47μF	10V	1
C208	CD1-0-6160-0001V	Electrolytic	10μF	16V	1
C210	CD2-2-6100-0001V	Electrolytic	22μF	10V	1
C211	CD2-2-6100-0001V	Electrolytic	22μF	10V	1
C212	CD1-0-6160-0001V	Electrolytic	10μF	16V	1

SEMICONDUCTORS

If necessary, replace both Diode D5, D6 (SVC 321) together with new ones which have the equivalent characteristics.

D5	202-5-1220-32113	Diode, SVC 321	1
D6	202-5-1220-32113	Diode, SVC 321	1
D7	202-5-2810-44210	Diode, DS 442	1
D8	202-5-2810-44210	Diode, DS 442	1
D9	202-5-2810-44210	Diode, DS 442	1
D10	202-5-2810-44210	Diode, DS 442	1

P.C.BOARD PARTS LIST

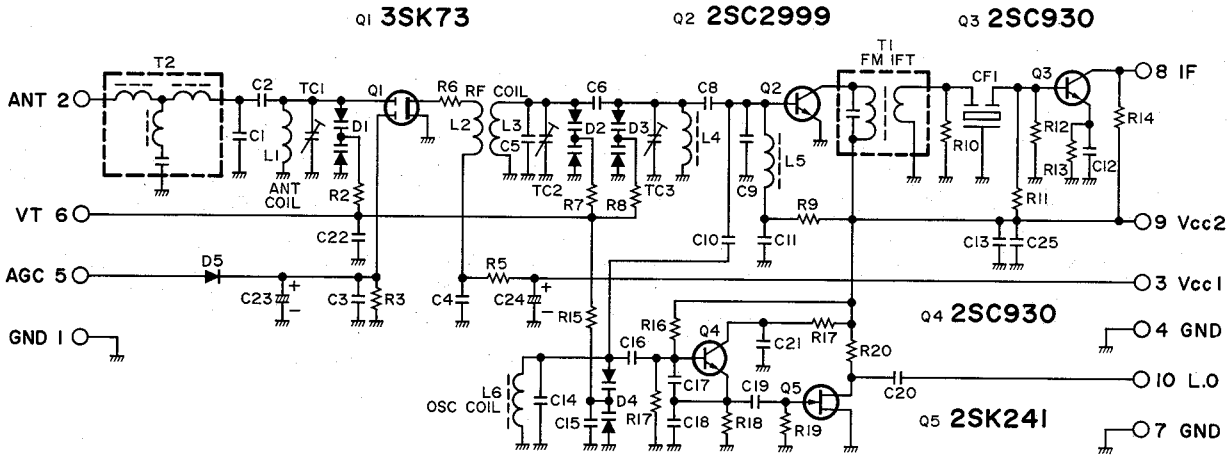
Ref. No.	Part No.	Description	Q'ty
D11	4-2029-75530	Diode, 1SS 135	1
D102	202-5-2810-44210	Diode, DS 442	1
D103	202-5-2810-44210	Diode, DS 442	1
D104	202-5-2810-44210	Diode, DS 442	1
D111	202-5-2810-44210	Diode, DS 442	1
D113	202-5-2810-44210	Diode, DS 442	1
D114	202-5-2810-44210	Diode, DS 442	1
D115	202-5-2810-44210	Diode, DS 442	1
D116	202-5-2810-44210	Diode, DS 442	1
D117	202-5-2810-44210	Diode, DS 442	1
D199	202-5-1410-00110	Diode, GMA 01	1
D201	202-5-0220-01010	Diode, DSF 10C	1
D202	202-5-0220-01010	Diode, DSF 10C	1
D203	202-5-0220-01010	Diode, DSF 10C	1
D204	202-5-0220-01010	Diode, DSF 10C	1
D205	202-5-3210-13011	Zener Diode, GZA 13X	1
IC1	207-5-3281-26110	IC, LA 1261	1
IC2	207-5-0743-40010	IC, LA 3400	1
IC3	207-5-6474-91310	IC, LC 4913	1
IC4	4-2069-73930	IC, TC 9147 BP	1
IC5	ITT- - -TD61-04P- -	IC, TD 6104 P	1
IC6	ITT- - -TD63-01AP-	IC, TD 6301 AP	1
Q3	203-5-4921-01280	Transistor, 2SD 1012	1
Q4	4-2039-71412	FET, 2SK 246	1
Q5	TTT- - -2SC7-32TMB	Transistor, 2SC 732	1
Q6	4-2039-71410	FET, 2SK 246	1
Q7	203-5-5000-53660	Transistor, 2SC 536	1
Q8	203-5-5000-53660	Transistor, 2SC 536	1
Q9	203-5-5000-53660	Transistor, 2SC 536	1
Q10	203-5-4921-01270	Transistor, 2SD 1012	1
Q11	203-5-4921-01270	Transistor, 2SD 1012	1
Q101	203-5-5000-53660	Transistor, 2SC 536	1
Q102	203-5-5000-53660	Transistor, 2SC 536	1
Q103	203-5-5000-53660	Transistor, 2SC 536	1
Q104	203-5-5000-53660	Transistor, 2SC 536	1
Q105	203-5-5000-53660	Transistor, 2SC 536	1
Q106	203-5-5000-53660	Transistor, 2SC 536	1
Q107	203-5-5000-53660	Transistor, 2SC 536	1
Q201	4-2039-71411	FET, 2SK 246	1
Q202	203-5-8570-33060	Transistor, 2SD 330	1
Q203	203-5-5000-53660	Transistor, 2SC 536	1
Q205	203-5-5000-53660	Transistor, 2SC 536	1
Q206	203-5-5000-53660	Transistor, 2SC 536	1
Q207	203-5-5000-53660	Transistor, 2SC 536	1
Q208	203-5-7230-60850	Transistor, 2SA 608	1
	RESISTORS		
R17	401 012 4503	CARBON 100 JA 1/4W	1
R18	401 022 0403	CARBON 68 JA 1/4W	1
R19	401 021 3009	CARBON 5.6K JA 1/4W	1
R20	401 012 7009	CARBON 10K JA 1/4W	1
R21	401 012 5708	CARBON 1K JA 1/4W	1
R22	401 003 5205	SOLID 8.2K KA 1/2W	1
R23	401 012 9300	CARBON 1M JA 1/4W	1
R24	401 024 7004	CARBON 1K JA 1/6W	1
R25	401 012 8105	CARBON 100K JA 1/4W	1
R26	401 024 8001	CARBON 1M JA 1/6W	1
R27	401 026 6609	CARBON 390 JA 1/6W	1
R28	401 026 1000	CARBON 2.7K JA 1/6W	1
R29	401 012 4503	CARBON 100 JA 1/4W	1
R30	401 016 4806	CARBON 22K JA 1/4W	1
R31	401 016 3809	CARBON 2.2K JA 1/4W	1
R32	401 024 7004	CARBON 1K JA 1/6W	1
R33	401 024 7707	CARBON 100K JA 1/6W	1

Ref. No.	Part No.	Description	Q'ty
R34	401 024 7707	CARBON 100K JA 1/6W	1
R35	401 020 2904	CARBON 47K JA 1/4W	1
R36	401 021 3009	CARBON 5.6K JA 1/4W	1
R37	401 025 8208	CARBON 22K JA 1/6W	1
R38	401 026 4308	CARBON 3.3K JA 1/6W	1
R39	401 024 7004	CARBON 1K JA 1/6W	1
R40	401 024 7004	CARBON 1K JA 1/6W	1
R42	401 026 9907	CARBON 4.7K JA 1/6W	1
R43	401 020 0801	CARBON 470 JA 1/4W	1
R44	401 021 3009	CARBON 5.6K JA 1/4W	1
R45	401 012 5708	CARBON 1K JA 1/4W	1
R46	401 012 7009	CARBON 10K JA 1/4W	1
R47	401 017 0807	CARBON 270 JA 1/4W	1
R48	401 026 1000	CARBON 2.7K JA 1/6W	1
R49	401 017 1804	CARBON 2.7K JA 1/4W	1
R51	401 012 5708	CARBON 1K JA 1/4W	1
R52	401 015 3800	CARBON 18K JA 1/4W	1
R53	401 016 1102	CARBON 22 JA 1/4W	1
R54	401 018 3807	CARBON 3.3K JA 1/4W	1
R55	401 012 7009	CARBON 10K JA 1/4W	1
R56	401 022 1905	CARBON 680 JA 1/4W	1
R57	401 014 6109	CARBON 150K JA 1/4W	1
R58	401 014 6109	CARBON 150K JA 1/4W	1
R59	401 016 3809	CARBON 2.2K JA 1/4W	1
R60	401 016 3809	CARBON 2.2K JA 1/4W	1
R63	401 012 8105	CARBON 100K JA 1/4W	1
R64	401 012 8105	CARBON 100K JA 1/4W	1
R65	401 016 3809	CARBON 2.2K JA 1/4W	1
R66	401 016 3809	CARBON 2.2K JA 1/4W	1
R67	401 012 7009	CARBON 10K JA 1/4W	1
R68	401 012 7009	CARBON 10K JA 1/4W	1
R69	401 016 1508	CARBON 22 JA 1/4W	1
R70	401 012 4503	CARBON 100 JA 1/4W	1
R71	401 016 2604	CARBON 220 JA 1/4W	1
R72	401 012 8105	CARBON 100K JA 1/4W	1
R73	401 012 7009	CARBON 10K JA 1/4W	1
R94	401 027 9005	CARBON 82K JA 1/6W	1
R95	401 025 1902	CARBON 15K JA 1/6W	1
R98	401 025 9809	CARBON 2.4K JA 1/6W	1
R101	401 020 2904	CARBON 47K JA 1/4W	1
R102	401 020 2904	CARBON 47K JA 1/4W	1
R103	401 020 2904	CARBON 47K JA 1/4W	1
R104	401 020 2904	CARBON 47K JA 1/4W	1
R105	401 020 2904	CARBON 47K JA 1/4W	1
R106	401 020 2904	CARBON 47K JA 1/4W	1
R107	401 020 2904	CARBON 47K JA 1/4W	1
R108	401 020 2904	CARBON 47K JA 1/4W	1
R109	401 020 2904	CARBON 47K JA 1/4W	1
R110	401 020 2904	CARBON 47K JA 1/4W	1
R111	401 020 2904	CARBON 47K JA 1/4W	1
R112	401 020 2904	CARBON 47K JA 1/4W	1
R113	401 020 2904	CARBON 47K JA 1/4W	1
R114	401 020 2904	CARBON 47K JA 1/4W	1
R115	401 020 2904	CARBON 47K JA 1/4W	1
R116	401 020 2904	CARBON 47K JA 1/4W	1
R117	401 020 2904	CARBON 47K JA 1/4W	1
R118	401 020 2904	CARBON 47K JA 1/4W	1
R119	401 020 2904	CARBON 47K JA 1/4W	1
R120	401 020 2904	CARBON 47K JA 1/4W	1
R121	401 020 2904	CARBON 47K JA 1/4W	1
R122	401 016 4806	CARBON 22K JA 1/4W	1
R123	401 016 4806	CARBON 22K JA 1/4W	1
R124	401 020 2904	CARBON 47K JA 1/4W	1
R125	401 012 8105	CARBON 100K JA 1/4W	1

P.C.BOARD PARTS LIST (Continued)

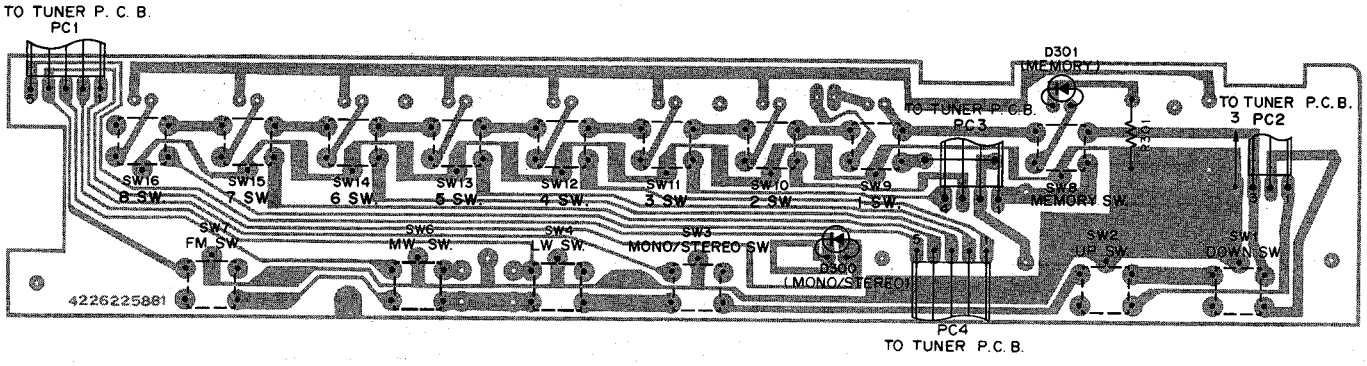
Ref. No.	Part No.	Description	Q'ty
R126	401 018 5801	CARBON 330K JA 1/4W	1
R127	401 017 1804	CARBON 2.7K JA 1/4W	1
R128	401 054 8804	OXIDE-MT 1K JA 1/2W	1
R130	401 012 7009	CARBON 10K JA 1/4W	1
R132	401 012 7009	CARBON 10K JA 1/4W	1
R134	401 012 7009	CARBON 10K JA 1/4W	1
R135	401 017 1804	CARBON 2.7K JA 1/4W	1
R136	401 027 5205	CARBON 680 JA 1/6W	1
R137	401 018 5801	CARBON 330K JA 1/4W	1
R138	401 026 4902	CARBON 330K JA 1/6W	1
R139	401 024 7004	CARBON 1K JA 1/6W	1
R140	401 012 7009	CARBON 10K JA 1/4W	1
R141	401 012 7009	CARBON 10K JA 1/4W	1
R142	401 012 8105	CARBON 100K JA 1/4W	1
R144	401 022 4104	CARBON 68K JA 1/4W	1
R145	401 022 4104	CARBON 68K JA 1/4W	1
R146	401 012 4503	CARBON 100 JA 1/4W	1
R147	401 026 9907	CARBON 4.7K JA 1/6W	1
R151	401 012 5708	CARBON 1K JA 1/4W	1
R152	401 012 4503	CARBON 100 JA 1/4W	1
R153	401 012 5708	CARBON 1K JA 1/4W	1
R154	401 012 5708	CARBON 1K JA 1/4W	1
R156	401 012 4503	CARBON 100 JA 1/4W	1
R157	401 016 4806	CARBON 22K JA 1/4W	1
R158	401 016 2604	CARBON 220 JA 1/4W	1
R159	401 012 5708	CARBON 1K JA 1/4W	1
R160	401 012 7009	CARBON 10K JA 1/4W	1
R161	401 020 2003	CARBON 4.7K JA 1/4W	1
R162	401 018 5801	CARBON 330K JA 1/4W	1
R163	401 012 7009	CARBON 10K JA 1/4W	1
R164	401 012 7009	CARBON 10K JA 1/4W	1
R165	401 024 7004	CARBON 1K JA 1/6W	1
R166	401 016 4806	CARBON 22K JA 1/4W	1
R167	401 016 4806	CARBON 22K JA 1/4W	1
R201	401 055 5307	OXIDE-MT 220 JA 1/2W	1
R202	402 016 0904	FUSIBLE RES 3.3 J- 1/4W	1
R203	401 012 5708	CARBON 1K JA 1/4W	1
R205	401 012 5708	CARBON 1K JA 1/4W	1
R206	401 012 5708	CARBON 1K JA 1/4W	1
R208	401 012 4503	CARBON 100 JA 1/4W	1
R209	401 012 4503	CARBON 100 JA 1/4W	1
R210	401 012 7009	CARBON 10K JA 1/4W	1
R211	401 016 4806	CARBON 22K JA 1/4W	1
R212	401 012 7009	CARBON 10K JA 1/4W	1
R213	401 012 7009	CARBON 10K JA 1/4W	1
R299	401 016 4806	CARBON 22K JA 1/4W	1
R605	401 012 7009	CARBON 10K JA 1/4W	1
R606	401 012 7009	CARBON 10K JA 1/4W	1
R607	401 012 7009	CARBON 10K JA 1/4W	1
R608	401 012 7009	CARBON 10K JA 1/4W	1
R609	401 012 7009	CARBON 10K JA 1/4W	1
R610	401 012 7009	CARBON 10K JA 1/4W	1
	KEYBOARD SWITCH P.C.B. ASSY		
21	141-0-1939-14021	Keyboard Switch P.C.B. Assy	1
	4-2262-25881	Keyboard Switch P.C.B.	1
SW1	4-2312-05801	Keyboard Switch (Down)	1
SW2	4-2312-05801	Keyboard Switch (Up)	1
SW3	4-2312-05801	Keyboard Switch (Mono/Stereo)	1
SW4	4-2312-05801	Keyboard Switch (LW)	1
SW6	4-2312-05801	Keyboard Switch (MW)	1
SW7	4-2312-05801	Keyboard Switch (FM)	1
SW8	4-2312-05801	Keyboard Switch (Memory)	1
SW9	4-2312-05801	Keyboard Switch (Station 1)	1
SW10	4-2312-05801	Keyboard Switch (Station 2)	1
SW11	4-2312-05801	Keyboard Switch (Station 3)	1
SW12	4-2312-05801	Keyboard Switch (Station 4)	1
SW13	4-2312-05801	Keyboard Switch (Station 5)	1
SW14	4-2312-05801	Keyboard Switch (Station 6)	1
SW15	4-2312-05801	Keyboard Switch (Station 7)	1
SW16	4-2312-05801	Keyboard Switch (Station 8)	1
	131-2-4208-49300	Spacer LED	1
	SEMICONDUCTORS		
D300	4-2029-71571	L.E.D., LN 224 RP (Mono/Stereo)	1
D301	D00- - -SLP- -173B-	L.E.D., SLP 173 B (Memory)	1
	RESISTOR		
R301	401 020 0801	CARBON 470 JA 1/4W	1
	ANTENNA TERMINAL P.C.B. AASY		
22	141-0-1939-14031	Antenna Terminal P.C.B. Assy	1
	4-2262-25891	Antenna Terminal P.C.B.	1
	4-2372-01141	Antenna Terminal 3P (Antenna)	1
L99	4-2539-71610	Choke Coil (470μH)	1
	LED P.C.B. ASSY		
23	141-0-1939-14041	LED P.C.B. Assy	1
	4-2262-25901	LED P.C.B.	1
	131-2-4208-42900	LED Spacer	2
	SEMICONDUCTORS		
D401	4-2029-72100	L.E.D., GL 9 NG 54 (Tuned)	1
D402	4-2029-72101	L.E.D., GL 9 PR 54 (Stereo)	1
	POWER SWITCH P.C.B. ASSY		
24	141-0-1939-14051	Power Switch P.C.B. Assy	1
	4-2262-25911	Power Switch P.C.B.	1
SW1	4-2319-76831	Switch Push 1Key (Power)	1
	CAPACITOR		
C301	CC1-0-3500-ZG00C	Ceramic 0.01μF 50V +80,-20%	1

FRONT END SCHEMATIC DIAGRAM



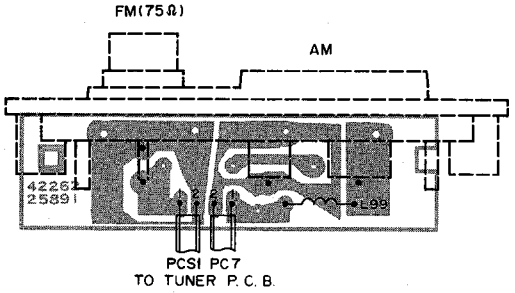
KEYBOARD P.C.BOARD

(BOTTOM VIEW)



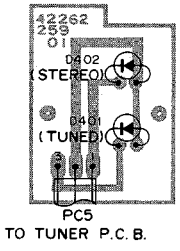
ANTENNA TERMINAL P.C.BOARD

(BOTTOM VIEW)



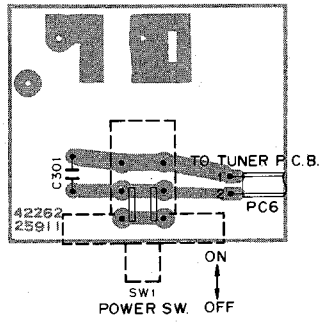
LED P.C.BOARD

(BOTTOM VIEW)



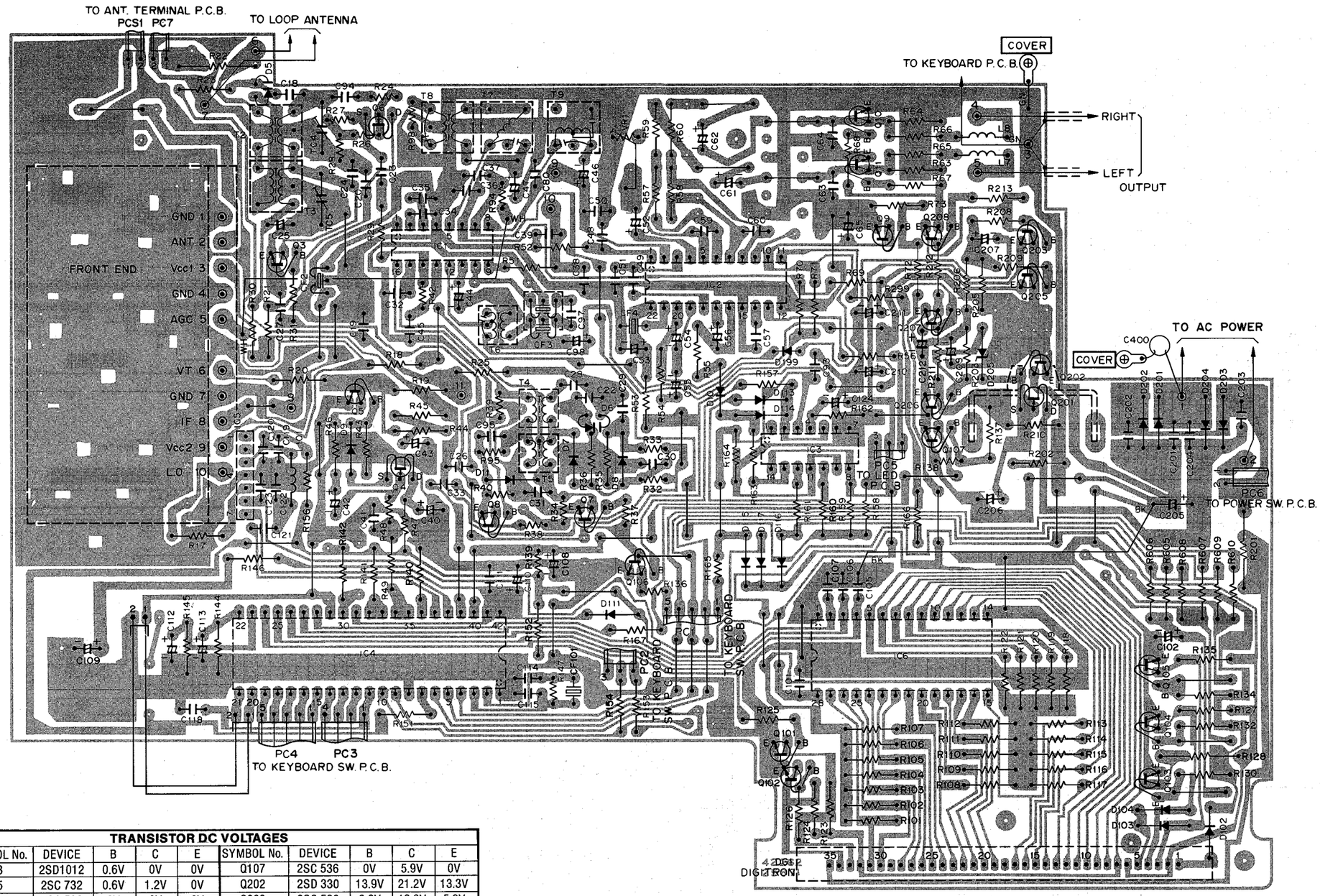
POWER SW. P.C.BOARD

(BOTTOM VIEW)



TUNER PRINTED CIRCUIT BOARD

(BOTTOM VIEW)



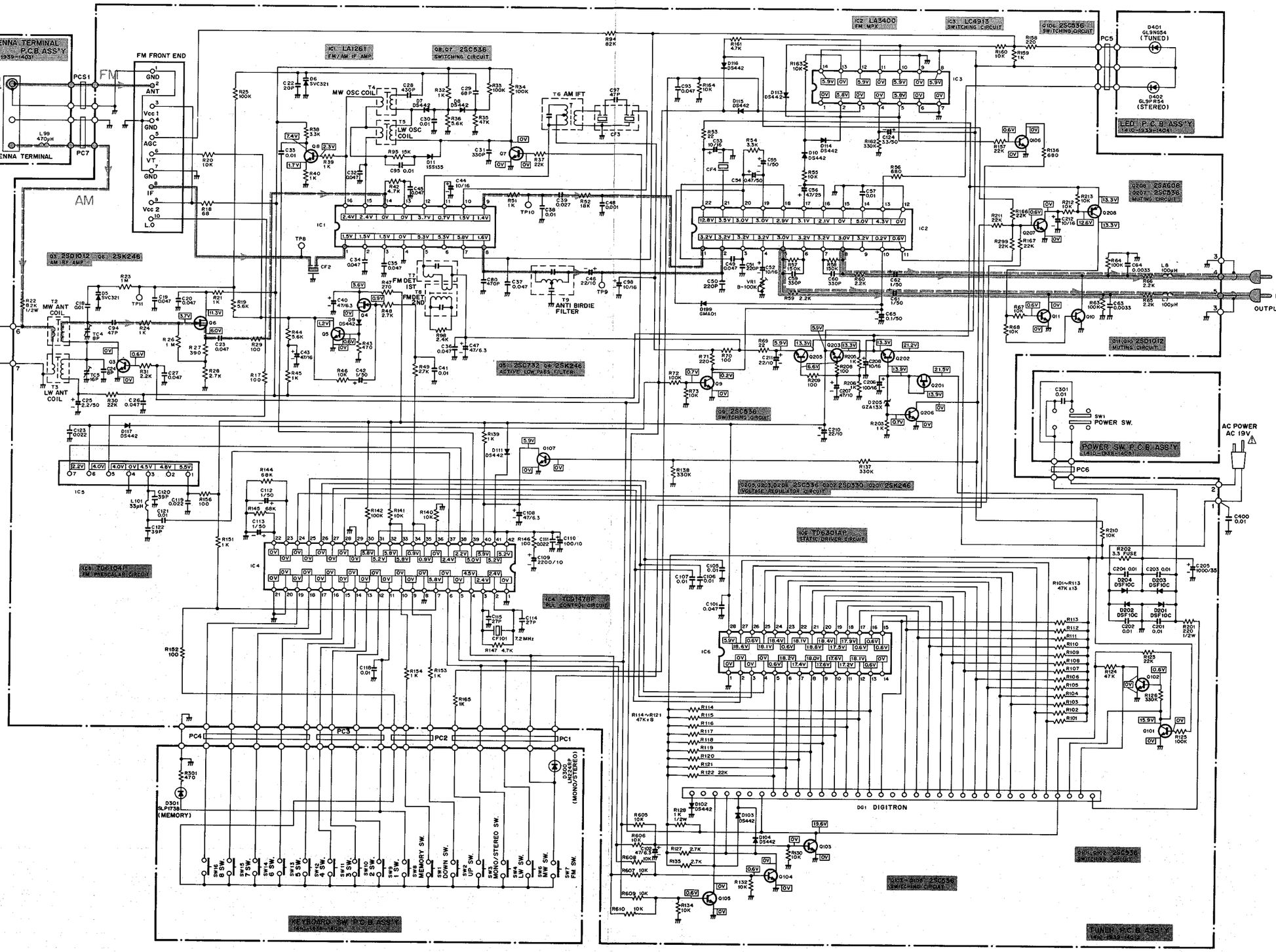
TRANSISTOR DC VOLTAGES

SYMBOL No.	DEVICE	B	C	E	SYMBOL No.	DEVICE	B	C	E
Q3	2SD1012	0.6V	0V	0V	Q107	2SC 536	0V	5.9V	0V
Q5	2SC 732	0.6V	1.2V	0V	Q202	2SD 330	13.9V	21.2V	13.3V
Q7	2SC 536	0V	0V	0V	Q203	2SC 536	6.6V	13.3V	5.9V
Q8	2SC 536	2.3V	7.4V	1.7V	Q205	2SC 536	6.6V	13.3V	5.9V
Q9	2SC 536	0.7V	0.2V	0V	Q206	2SC 536	0.7V	0V	0V
Q10,11	2SD1012	0.6V	0V	0V	Q207	2SC 536	0.6V	0V	0V
Q101	2SC 536	0V	15.9V	0V	Q208	2SA 608	12.6V	13.3V	13.3V
Q102	2SC 536	0.6V	0V	0V					
Q103	2SC 536	0V	19.6V	0V			G	D	S
Q104	2SC 536	0.6V	0V	0V	Q4	2SK 246	0.9V	5.6V	0V
Q105	2SC 536	0.6V	0V	0V	Q6	2SK 246	3.7V	11.3V	6.0V
Q106	2SC 536	0.6V	0V	0V	Q201	2SK 246	13.9V	21.5V	13.9V

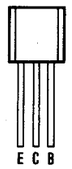
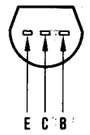
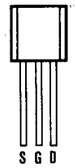
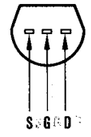
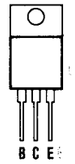
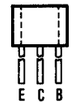
IC PIN NUMBERS DC VOLTAGES

SYMBOL No.	DEVICE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
IC1	LA 1261	1.5V	1.5V	1.5V	0V	5.3V	5.3V	5.8V	1.6V	1.4V	1.5V	0.7V	3.7V	0V	0V	2.4V	2.4V				
IC2	LA 3400	3.2V	3.2V	3.2V	3.2V	3.0V	3.2V	3.2V	3.0V	3.2V	0.2V	0.6V	0V	4.3V	5.0V	0V	2.1V	3.1V	2.9V	3.0V	3.0V
		21	22																		
		3.5V	12.8V																		
IC3	LC 4913	0V	5.8V	0V	0V	5.8V	0V	0V	5.9V	0V	5.9V	0V	5.9V	0V	5.9V						
IC5	TD 6104P	5.5V	4.8V	4.5V	0V	4.0V	4.0V	2.2V													

SCHEMATIC DIAGRAM



SEMICONDUCTOR LEAD IDENTIFICATION

TRANSISTOR	FRONT VIEW	BOTTOM VIEW
2SA 608 2SC 536 2SC 732		
2SK 246		
2SD 330		
2SD 1012		

TERMINAL NAME

B → BASE	S → SOURCE
C → COLLECTOR	G → GATE
E → EMITTER	D → DRAIN

SWITCH NAME & POSITION

No.	Name	Position
	Keyboard SW. P.C.B. Assy	
SW1	DOWN Switch	OFF
SW2	UP Switch	OFF
SW3	MONO/STEREO Switch	STEREO
SW4	LW Switch	OFF
SW6	MW Switch	OFF
SW7	FM Switch	OFF
SW8	MEMORY Switch	OFF
SW9	STATION 1 Switch	OFF
SW10	STATION 2 Switch	OFF
SW11	STATION 3 Switch	OFF
SW12	STATION 4 Switch	OFF
SW13	STATION 5 Switch	OFF
SW14	STATION 6 Switch	OFF
SW15	STATION 7 Switch	OFF
SW16	STATION 8 Switch	OFF
	Power Sw. P.C.B. Assy	
SW1	POWER Switch	OFF

NOTES:

1. All resistors values are indicated in "ohm" ($K=10^3$, $M=10^6$).
2. All capacitors values are indicated in "μF" ($P=10^{-12}$).
3. All voltages indicated on the schematics are measured under the following conditions.
   a. Use a V.T.V.M.
   b. All voltages ±10 % with respect to chassis ground.
   c. FUNCTION SW. : set to "FM" position.
   d. No signals at input terminals
   f. AC input at 19 volts 50 Hz.
4. This is a basic schematic diagram.

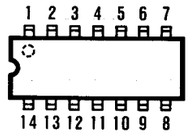
Because Fisher products are subject to continuous improvement, Fisher Corporation reserves the right to make any changes or modifications without notice.

PRODUCT SAFETY NOTICE

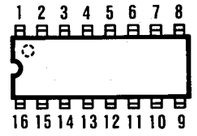
Each precaution in this manual should be followed during servicing. Components identified with the IEC symbol ⚠ in the parts list and the schematic diagram designate components in which safety can be of special significance. When replacing a component identified with ⚠, use only the replacement parts designated, or parts with the same ratings of resistance, wattage or voltage that are designated in the parts list in this manual.
Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before returning the product to the customer.

SEMICONDUCTOR LEAD IDENTIFICATION (Continued)

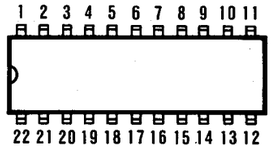
LC 4913 BOTTOM VIEW



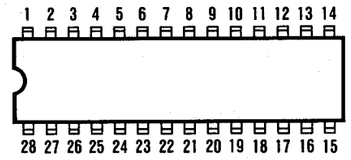
LA 1261 BOTTOM VIEW



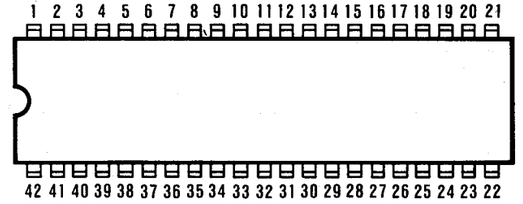
LA 3400 BOTTOM VIEW



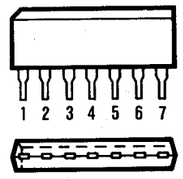
TD 6301 AP BOTTOM VIEW



TC 9147 BP BOTTOM VIEW



TD 6104 P FRONT/BOTTOM VIEWS



MEMO

FISHER

FISHER Hi-Fi Europa Vertriebs GmbH

Stahlgruberring 4
8000 München 82

Tel: 089/420 45-0
Tlx: 524033

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Ersatzteillager	–155/156
Techn. Schulung	–174

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Sie sparen so wertvolle Zeit. Vielen Dank.

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